The CHEMIST

Bulletin of

THE AMERICAN INSTITUTE OF CHEMISTS, INC.

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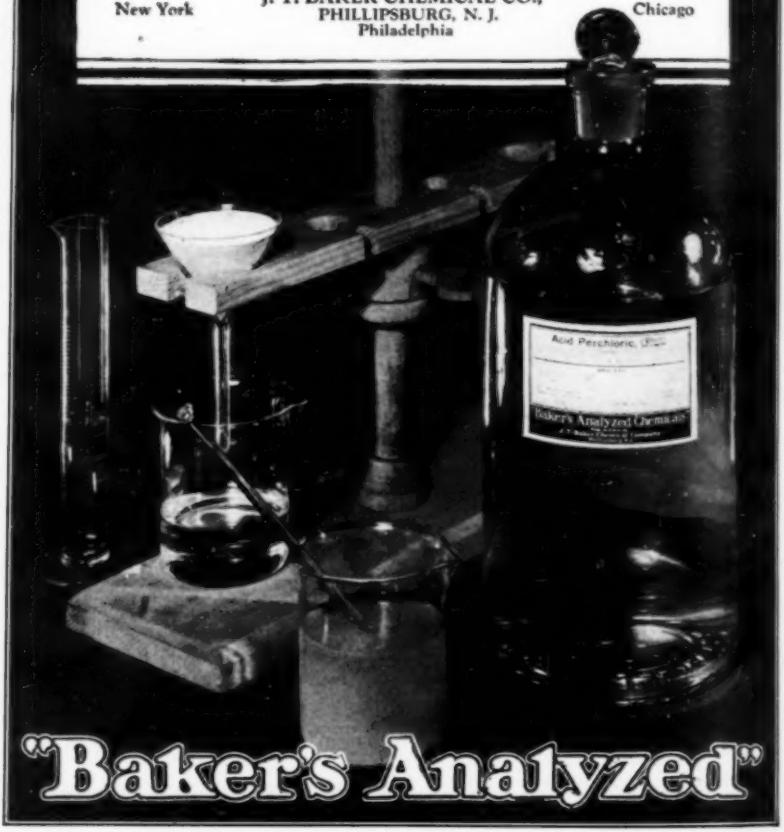

"Baker's Analyzed"

CHEMICAL EDUCATION IN HIGH SCHOOL AND COLLEGE

By Dr. Owen L. Shinn, F.A.I.C.

Résumé of an address to the Pennsylvania Chapter, January 6, 1931.

The early chemists were trained for medicine or the ministry, and chemistry was very largely a side line. The earlier teachers were called Professors of Natural Science, and chemistry was lumped with physics and other sciences under the heading of *Natural Science.*

The first professor of chemistry was Benjamin Rush, who was appointed in 1769 at the University of Pennsylvania. In the earlier days chemistry was taught chiefly by lecture, and Benjamin Rush, who had been a pupil of Black in Edinburgh, in stating his qualifications, said that he had "seen all the experiments performed twice in his presence." Advanced study could be gained only through work in private laboratories. Many professors conducted private laboratories in which each would have a certain number of pupils, and this practice has been continued down to the present time. I became interested in chemistry in high school and on graduation in 1888 I debated with myself whether to enter the private laboratory of Booth, Garrett, and Blair, or to enter the University of Pennsylvania, finally deciding on the latter.

Prior to 1880, laboratory work was unknown in high school; and in college it was entirely analytical. At the University of Pennsylvania, when the Towne Scientific School was established in the early 70's, laboratory courses were offered in only analytical and applied chemistry. There was no organic chemistry course. General chemistry was given by lecture only, and the laboratory work consisted of the analysis of ores and food products.

About 1880 the demand arose for chemistry from the laboratory standpoint. The secondary schools then took up laboratory work. By 1915, amalgamation with other sciences took place and the *general science* course was springing up in high schools. Since 1925 numbers of our schools have been giving laboratory courses equivalent to a first-year college course which is intended both for cultural chemistry and for professional preparation, and unfortunately not split. These are usually taught as one-year courses. Frequently the high school course is patterned closely after the college work, due to the teacher's passing on what he was taught—and many a college professor has found his pet stories coming back to him this way.

I have advocated the abolition of laboratory work in the smaller high schools, where there are not enough qualified teachers. In Pennsylvania

the requirements for teaching chemistry stipulate but three semester hours' work in chemistry as a minimum.

The objectives of a high school course should be: *first*, to teach the student to think, to observe, and to reason from what he observes; *second*, to note the place that chemistry plays in our lives; *third*, to note the relation of chemistry to the other sciences; and *fourth*, to inspire confidence and a respect for truth. Because these objectives are sometimes forgotten, considerable attack is made on the one-year course, sometimes by chemists because of its inadequacy, oftener by those who see nothing in science. Chemistry is now taught in the high school in one of four forms: (1) as a truly scientific course in all its abstract and complicated form (which is a bit too much for immature minds); (2) as "pandemic" chemistry, laying emphasis on the second objective noted above; (3) as industrial chemistry; or (4) as an orientation course. Which form it takes depends on the individual.

How then shall chemistry be presented? Theses have been written on the subject and it is a matter of dispute. Some persons do not learn from laboratory work and others do. In first-year college chemistry, in order to get a higher average efficiency, it is necessary to separate those who have already had chemistry from those who have not. Kindergarten methods are being introduced into the high schools, involving charts, models, and other such time-distracting subjects as cardboard models of organic tetrahedrons. It is my suggestion that the teacher is the important factor, and that chemistry should be taught only by persons who are qualified to teach it, and who have also progressed a sufficient distance from their general chemistry to have a true perspective of it. According to our state law the content means nothing and the method everything, and even a learned Ph.D. in chemistry cannot teach in a high school unless he has had a minimum of eighteen semester hours of pedagogy. It seems to me that the professionalization of chemistry by The American Institute of Chemists should include emphasis on the teaching of chemistry by *chemists*.

With regard to professional chemistry—at the recent Minnesota symposium of the American Chemical Society there was quite general agreement that the graduate of a reputable school is assumed to know the fundamentals of chemistry. Courses are taught today in a much broader way than they were taught fifteen or twenty years ago. Yet even now there is a group that believes that chemistry should be taught as it will be used. That, however, is *training* not education; and fortunately it is not the general trend. In the old days every chemist was primarily an analyst.

There is a change today in the attitude of the chemist toward mathematics, and now we recognize chemistry as a mathematical science. The necessity is realized for the presence of outside or cultural courses in the

chemical curriculum. There is a constant clamoring for specialized courses, but the fundamentals are insisted on first, and the specialties come afterward. Character is a prime requisite in the industrial field, and so is the desire to play fair—in other words, industry is demanding ethical conduct just as this organization does.

During the discussion, Mr. Berry brought up the question of the interrelation of high school and college chemistry. Dr. Shinn commented that judging from the graduates, the New England high schools have the best designed courses, reflecting chiefly on the character of the teachers and their better, more stable organization. Some of the city high school laboratories are better equipped than the smaller colleges. In Philadelphia the local requirements for chemistry teachers are far in excess of the state law.

Dr. Shinn said that personally he favors "pandemic" chemistry for one-year courses, as best suited to arouse interest. In reply to a query by Mr. Jones about the chemist who never gets beyond the routine stage, he said that it is impossible to make chemists of all who start, and that fifty per cent of the boys in college do not belong there—the ideal state being one, of course, where a pre-selection could be made, to prevent students from getting into the wrong courses.

Dr. Porter suggested that the speaker's point of *chemistry taught by chemists* be brought before the National Council, a sentiment in which the rest of the chapter concurred.

Mr. Bertolet emphasized the need of looking into the Boards of Education themselves. Mr. Stoertz told of his experiences in getting the laboratory to mean something to the student. Dr. Shinn advocated the use of the notebook in that respect, together with the necessity for laboratory teaching. Dr. Tyson quoted from a recent article in the *New York Times* by Dr. R. A. Millikan, which stressed Dr. Shinn's points.—F. D. JONES

Everything intended for publication in *The* CHEMIST should be sent to the Editor, Florence E. Wall, at the NEW OFFICE of the INSTITUTE

2189 Woolworth Building

233 Broadway, New York

THE CO-ORDINATION OF CHEMISTRY AND ENGINEERING

In his talk before the New York Chapter on January 16th, Robert T. Pollock, internationally known consulting engineer, brought out very forcibly the truth which the Educational Committee has been trying to promulgate: namely, that "a chemist must be more than a chemist."

Mr. Pollock is a graduate of the Worcester Polytechnic Institute and has done graduate work at the Massachusetts Institute of Technology. His consulting work in engineering problems has taken him into many different fields, and his published work has brought him wide recognition as an authority on lighter-than-air craft, steel treating, electric transportation equipment, and Diesel engines. In oil cracking and petroleum refining he is the author of more than forty patents.

With natural modesty, but with telling effect, Mr. Pollock discussed the value of close co-ordination between chemistry and engineering, and by citing numerous instances from his personal observation and experience, he brought out the necessity for broader vision on the part of chemists in industrial work.

He believes, for instance, that laboratory work should always be undertaken with the definite guiding thought of ultimate practical application in mind; and that laboratory-planned and developed processes should be worked out on at least a semi-commercial scale before being submitted for acceptance as a plant proposition. In this connection, he cited many experiences wherein chemical processes which seemed to work beautifully in the laboratory were not feasible in the plant without further experimentation by the engineers who knew how to analyze the problems from the point of view of more knowledge—and different knowledge from that possessed by the chemists.

Mr. Pollock feels that because pure chemistry is so very rigidly defined, too many chemists are content to go on their own way, working for the ends of pure science, rather than for applications which will show the practical good of their discoveries. To call a halt on too much theorizing, and to check chemical work for its practical use, he believes that every chemical industry should have a bridge builder on its board of directors. If a real one cannot be found, at least a figurative one should be installed—the typical outsider who, because he knows nothing of a given business, can ask the innumerable question on the "what?" and "why?" and "what is it for?" which are too frequently necessary to bring chemists back to earth and a realization of the impracticability of a project.

Two stories brought out the unfortunate lack of adaptability to plant conditions of chemists whose ideas were workable in the laboratory but

held up in development because they could not think outside of it; one case with an asphalt emulsion, another with a good idea on separating red and white blood corpuscles.

Two other stories brought out valuable commercial processes of which the possibilities had passed unnoticed for years by the chemists who should have been the logical discoverers and developers. One case is the manufacture of carbon dioxide snow—"dry ice"—which had for years been a wasted product of the lime industries. "Within sixty days a certain steel company will offer to the lime companies a chance to convert carbon dioxide into cash. But," added Mr. Pollock, "the chemist should have thought of this first—not the steel man."

Another case is that of the new steel-blasting process which has recently revolutionized the industry, and threatens to do away with the old process of pickling the steel. Someone, not a chemist, discovered that steel can be blasted with steel dust in the manner of sand blasting. The experimental testing of the process has proved so successful that steel-blasting apparatus is already available in various sizes, costing from $50,000 to $500,000, by which even a large sheet of steel can be treated in thirty seconds.

From steel problems, Mr. Pollock next discussed the retreading of automobile tires, the plant processes on southern pine, and improvements in the mustard business.

The discussion of his association with practical aeronautics brought him right down to date, for he told of his own experiences with the ill-fated R-101 which met its untimely end under such tragic circumstances. A study of the gas cells used in dirigibles like the Los Angeles, the Graf Zeppelin, and the R-100 and R-101, raised the important question of whether an organic substance such as goldbeaters' skin is safe to use over a long period of time.

Mr. Pollock's recommendation to the chemists was that they immediately search out some fabric which could be used in place of the goldbeaters' skin. At the time he made his observations on the R-100 and R-101, the gas cells had been made more than a year earlier; and at the time of the accident, the gas cells of the R-101 were about eighteen months old.

At the official inquest on the disaster, Dr. Hugo Eckener expressed the belief that the R-101 failed because the forward (nose) gas cells must have broken down in some way, and caused leakage of the gas.

Mr. Pollock agreed with this explanation, and stated further:

> The nose would thus become heavier and tend down; the nose actually was down at the time of the crash. Some of the escaped gas probably percolated along the gas channels toward the tail and consequently upset the equilibrium. Add to this about eight tons of water from the rain which, due to the depression of the nose, ran forward and lowered the nose still more. The whole unbalanced condition brought them lower and lower.

The papers indicated that the R-101 ran into a mountain, but it did not run into even a hill; merely into a pile of dirt that was left from digging a trench. The contact was all that was needed to set the spark that caused the explosion.

In the United States two men conceived the idea of taking latex and making a latex cell. After a great deal of trouble one was made which has now been for some time in the tail of the Los Angeles. This cell has proved very satisfactory and very interesting. It will be well tried out, and in all probability some of our future ships—not the Akron, but others—may be fitted with this latex cell. Of course, the danger from a goldbeaters' skin or rubberized gas cell has been greatly minimized by the use of helium gas in this country.

Within the last five or six months, patents have been allowed to a man who has made an all-metal gas cell. To make an all-metal cell and have it contain gas is not easy. And in referring to this all-metal gas cell we must refer to the chemical achievement which is the basis of its success. The new ship ZR-2 which was put into the air at Detroit is an all-metal ship. It was started as a duralumin ship, but at the time of the invention of the new metal (duralumin coated with pure aluminium), it was only one-quarter finished. Since the new metal is guaranteed to meet all requirements, they destroyed all the work done on the ship and rebuilt it entirely of the new metal. It is interesting to note that the permeability is less than goldbeaters' skin or latex.

In concluding his address Mr. Pollock said, in part:

But if I can speak for the chemist and encourage him to determine to understand as thoroughly as possible the problem that he has to work on or that he knows his organization is working on—even if he is one little cog in the wheel I shall be satisfied.

There is no question but that the heads of industry are looking very hard for men who know their business but who are also capable of thinking in terms which are very broad as applied to their particular industry. I know case after case where industries are looking for persons of this type and are unable to find men. A man should be more than a very excellent pure chemist. It behooves the chemist not only to be good in his own work but also to be more useful in a broad way; to know not only what a thing is, but also what it can be used for.

Dr. Cottrell, in discussing Mr. Pollock's address, presented in a very interesting manner, a rather complete corroboration of the ideas which had been presented. Speaking from his background of valuable experience as a university professor of physical chemistry, an inventor and a former director of the Fixed Nitrogen Laboratories at Washington, he agreed that there is particular value in the possession, by chemists, of broad interest and imagination. He had seen many instances where these combined attributes were the "open sesame" to success. He said, however, that there are many of these qualities which some people seem to have, and others do not, and that, accordingly, it is difficult to indicate how any curriculum could be changed to give some people what they do not have. He stated one interesting policy of his teaching work, which he has carried out in the government laboratories; namely, that a man, though specializing, shall not divorce himself from other major interests which the

laboratory as a whole has under consideration. He believes that interchange of views by specialists in diverse fields is mutually enriching.

Dr. Frederick Breithut, National President of the Institute, gave an excellent discussion of Mr. Pollock's paper. His viewpoint was that of director of one of the largest college laboratories in the United States, consulting engineer, and corporation executive. He cited a number of personal experiences and came to the defense of the chemist. His anecdotes showed the extreme importance for both scientific and lay persons of recognizing the very simple elements in a complex problem.

PHILADELPHIA CHEMISTS HONOR HENRY LEFFMAN

The Philadelphia Chapter was invited in a body to attend a memorial meeting to the late Dr. Henry Leffman, at the Wagner Institute of Science on January 16th.

Dr. Wilmer Kruger, President of the Philadelphia College of Pharmacy and Science presided. Tributes were read by Dr. Wagner, President of the Wagner Institute, Dr. Charles H. LaWall, F.A.I.C., Dean of the College of Pharmacy, and by a representative of the Central High School, where Dr. Leffman had gone to school, and had taught very early in his career. Dr. Max Trumper, F.A.I.C., showed two motion pictures of Dr. Leffman in his laboratory.

Dr. Leffman was one of the "grand old men" of American chemistry; a physician, who, however, did most of his work in chemistry, an author, a teacher, and a public-spirited citizen. Perhaps because he felt that his work would live in the hearts and memories of those who knew him, Dr. Leffman left a written request that nothing be published about him beyond the date of his birth—September 9, 1847—and of his death—December 25, 1930.

This manifestation of extreme modesty is a distinct handicap to those who would only too gladly give him full credit for the very unusual work which he did as Port-Physician, Coroner's Expert Chemist in solving poison mysteries, Food Inspector, Professor of Chemistry in various Philadelphia schools and colleges, a life-long zealous research worker himself, and a most generous patron of others who wished to do research.

Into one long lifetime this man crowded enough for several careers. Last May the Franklin Institute made him an honorary member "in recognition of valuable services to science in research, in teaching, as former Port-Physician, and as a discriminating but good-tempered critic."

—B. A. LEVITT

CHEMISTRY—A MEANS TO AN END

The Chemist in the Food Industries

The following excerpts from two articles by A. A. Schall,[1] a member of the Technical Bureau of the Biscuit and Cracker Manufacturers Association of Minneapolis, Minn., offer a striking proof of the oft-recurring remark that "a chemist must be more than a chemist."

Though chemists are not numerous in the baking field, they are finding increasing opportunities for service. More chemists are needed today but their success will depend perhaps on somewhat different qualifications than those demanded in other fields. The following remarks deal particularly with experiences in biscuit and cracker, and cake plants, though other types of plants might offer very similar problems. We should all have a common purpose, however, and that is to help the chemist make good in the baking industry, and suggest how the universities might do a little more to lower the fatality of young fellows well-trained in chemistry but unable to get under way out in the commercial field.

Chemists associated with biscuit and cracker plants should have first of all a good foundation in food chemistry, and certain chemical engineering subjects will be found very helpful. Far too often the chemist lacks the development that comes from liberal arts and business courses. Particularly is this true in connection with the "man to man" training that can be obtained to some extent in the university but that is too frequently considered insignificant by those who teach chemistry. The building up of desirable personality traits, along with a staunch character and a sound body, is fully as important to the baking chemist as to the college man in other fields; possibly, even more important. Nor is the university too early for instruction in the fundamentals of working under, with, and over men, principles that are not as intangible as many think.

When in college one is given his fill of chemistry and told that this is what he needs most now, and that later on ample opportunity will come to pick up the other, non-chemical qualifications that will help round him out. As a matter of fact the great majority of disappointments that come to chemists in baking plants are attributable to failure to deal with fellow workers, and not to any lack of chemical knowledge. Often the chemist pays too high a price for acquiring methods of co-operating, handling labor, and other training extraneous to chemistry, the grasp of which might have been given him when in school by his class advisor, or others peculiarly

[1] "Mapping a Course for a Chemist in the Food Industries," *Food Industries*, Sept., 1930; "How a Chemist Can Best Serve the Food Industries," *Id.*, Dec., 1930.

fitted to handle that important phase of his training. It is also unfortunate that the student chemist during his college years seems to have a lively dislike of such outside studies as foremanship, business organization, and others that ought to be taken to fill in the electives on the curriculum.

When the chemist enters the baking plant he must decide first of all whether or not he wants to make chemistry a profession or a stepping stone in the baking business. A very few large baking organizations with relatively large chemical staffs may afford to have men who consider chemistry as a profession. The baking industry in general wants chemistry used as a tool to make profits for the plant. It is difficult for a young chemist to understand that it is not degrading to chemistry to use it in such fashion. There is no better way for him to contribute to the profession at large than by being imbued with the spirit of baking better bread, better biscuits and crackers, and better cakes with the aid of such chemistry as is needed, rather than by building so pretentious a laboratory as to find difficulty in fitting it into the scheme of the plant. Baking plants cannot find enough chemists today who are willing to take this stand. Business consolidations in the years to come may cause us to modify this opinion but we are discussing here the chemist in the baking plant of today.

The initial work of the chemist in the baking plant will depend largely on the experience and plans of the man who is fostering his *entrée* into that plant. It is advantageous to have the chemist start with a small laboratory and then build it up around the plant problems. The laboratory should not be a separate department, but a part of the production department. A four or five thousand dollar investment in a laboratory for a young chemist is very apt to show red in the ledger account for too long a period, during which the chemist strives in vain to post his credits, because his training in college has not been aimed to make him show profits for his employer. Experience has shown also that a fully equipped laboratory set up for the chemist when he first enters the plant is apt to result in his living in that space too much of the day, running every determination on a shortening from the percentage of moisture to the iodine number. He should be out in the plant more of the time, seeing what determinations were really needed on that raw material. On the other hand the chemist needs isolated laboratory space with certain fundamental equipment. That laboratory, after all, contains the implements with which he has been accustomed to work and they must not be taken from him. They are valuable tools but only one set among several others which he must soon learn to use.

It is often very satisfactory for the manager of the biscuit plant to assign to the new chemist one or two definite tasks, preferably those which can be attacked promptly and efficiently by one with a chemical training. For

example, the chemist might be given the responsibility of keeping in order all the balances and scales in the plant, or the job of making the invert sirup. Such early duties may take only a portion of his time but they give him an *entrée* into different departments that help him start the development of the good-will and faith toward him, without which he cannot go far.

From the start the chemist must work in with the men and must be one of them. His progress will be all the faster if he rolls up his sleeves, feigns no knowledge he does not have, conceals that aristocracy which sometimes comes with a chemical training, and decides that he is a fellow laborer with the rest of the gang, worthy today of their respect as a worker under or with them, and tomorrow as their leader. The men in the plant respect the training which they know the chemist must have. The chemist in turn must respect that solid experience which comes to those who have toiled for years, perhaps at one machine. Here one chemist will find a difficulty, and another will not. Some might explain it on the fact that the one chemist has simply not been properly trained or has not found time to sit down and think over the simple code of the man in working clothes.

* * *

Let us consider some of the ways in which the chemist can render a service to four of the major departments in the organization:

In the *purchasing department* the chemist will find that he can aid in

1. Developing specifications on raw materials.
2. Interpreting plant operations in terms of raw materials.
3. Checking up on claims of suppliers.
4. Supplying sources of technical information.
5. Disposing fairly and efficiently of new brands and types of materials.
6. Enhancing the prestige of the department with supplying houses.
7. Conveying helpful information to raw material suppliers who too often must grope in the darkness on how their materials are being used.

The chemist can render valuable assistance to the *production department* in

1. Maintaining uniformity on finished goods.
2. Reducing the cost of production through substitution of ingredients, elimination of unnecessary processing, discarding worthless ingredients, and duplicating high-priced proprietary raw materials.
3. Interpreting scientific facts in terms usable by the production manager.
4. Making small scale experimental runs.
5. Introducing new raw materials into the mixes.

6. Acting as a liaison officer with other departments.

7. Insuring proper co-operation at all times with government officials in the administration of the food laws.

8. Gradually substituting science for art in old industrial procedures.

The chemist will find working closely with the *accounting department* very profitable. It is this department which can help him most in evaluating in dollars and cents the results of his work. He can render aid to the cost accountant in

1. Helping to select the items on which an intensive cost analysis should be made.

2. Explaining abnormally high costs.

3. Developing methods for obtaining cost data on items where so-called "invisible" factors are operating.

4. Interpreting cost data for the production manager.

The *sales department* will soon find that it should call upon the chemist for help in

1. Developing effective and ethical advertising copy.

2. Supplying salesmen as a group with authentic information on the food value of products.

3. Handling certain correspondence such as that with educational institutions on the place of foods in the menus.

4. Checking up complaints on deliveries.

5. Assisting in proper co-operation with the production department.

Considering the departments of the plant as a whole, the chemist may in time

1. Take the leadership in forming study or training groups.

2. Assist the general superintendent in synchronizing certain operations common to several departments.

3. Become the plant question box for information commonly thought to be in the hands of the scientifically trained man.

There is little or no opportunity, of course, for any fundamental research work in the average plant. Practical research, however, must be carried on at all times, and it offers delightful opportunities to the chemist to make his department pay dividends. The following points are mentioned as some that should be kept in mind in selecting and carrying out such practical research work:

1. The problem must originate, of course, within the plant.

2. The research work must be selected to increase the profits of the plant.

3. The loyalty, faith, and co-operation of the men in the shop must be secured and maintained.

4. During the progress of the work the men in departments that are

concerned should be acquainted with the plan of the experiment. This is an effective means for building future good-will toward the chemist.

5. Proper help from plant executives will minimize interruptions, interferences, and unnecessary delays in the work.

6. It must be assured that proper credit be obtained for the accomplishment. If the work was conducted so as to develop an *ésprit de corps*, there is little danger of the chemist not receiving proper credit.

7. Finally, when the work is completed, support must be given by the proper executives for utilizing the results and translating them into profits.

Sooner or later, every chemist will find a hobby in the organization with which he is connected. It may be cost accounting, production, sales, or some other phase of the business. Such hobbies invariably develop around the special abilities of the man. When the chemist sees this development of his interest, he has only to nourish it and correct his shortcomings in order that he may eventually assume an important responsibility in that phase of the organization.

There are splendid opportunities in the food field for the chemist with a good chemical training used as a tool along with those other vital qualities of proper mental attitudes, tact, creative ability, initiative, resourcefulness, loyalty, and leadership. If he keeps his development thus rounded out he should occupy in time a position of leadership in the plant.

ADDRESSES WANTED FOR

MISS ISABELLE DAVISON COLLINS
Formerly at 342 Cherry Street
New York, N. Y.

JOHN H. KUESEL
Formerly at 42 Broadway
New York, N. Y.

FLORIAN R. KAPP
Formerly at 448 E. 58th Street
New York, N. Y.

ANDRES SOLOMANOFF
Formerly at 76 West End Avenue
Brooklyn, New York

MARCEL E. SCHERER
Formerly at Room 2015, 15 Park Row
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Bayonne, N. J.

THE NATIONAL COUNCIL

The seventy-seventh meeting of the Council of The American Institute of Chemists was held at The Chemists' Club, 52 East 41st Street, New York, N. Y., on Friday, January 23, 1931.

In the absence of President Frederick E. Breithut, Dr. M. L. Crossley presided. The following councilors and officers were present: Henry Arnstein, M. L. Crossley, J. F. X. Harold, H. S. Neiman, Allen Rogers, A. P. Sachs, F. W. Zerban, F. W. Zons.

Mr. E. F. Cayo, Philadelphia Representative, and Mr. K. M. Herstein, New York Representative, were present.

Mr. Frederick Kenney, Chairman of the New York Chapter, was present. He reported that the Institute will have space at the Exposition of Chemical Industries to be held May 4, 1931; and for the Public Relations Committee he reported progress relative to an Institute emblem and Institute colors.

Miss Florence E. Wall was present for a short time. She reported on *The* CHEMIST and urgently requested communications and articles from members of the Council, and the members of the Institute at large. The general policy of *The* CHEMIST was discussed.

The minutes of the previous meeting were read and approved.

The report of the Treasurer as of January 23, 1931, showing cash balance of $3,346.90 and the Accounts Receivable as $204.00 with all bills paid, was received and accepted.

Mr. Herstein reported for the Committee on Legislation, and submitted a tentative report upon licensing, which report was accepted and the Committee was requested to submit a detailed report at the next meeting of the Council.

Mr. Herstein also submitted a tentative report on contracts. The matter was referred back to the Committee on Legislation and the Committee was requested to report in detail at the next meeting of the Council.

The Secretary reported that it was possible to obtain an office in the Woolworth Building for the uses of the Institute. Upon motion made and seconded, the Secretary was directed to enter into a lease on this office in behalf of the Institute.

The Secretary reported as follows relative to the present membership:

Members Paid: Fellows, 366; Associates, 44; Juniors, 31.

Members not Paid: Fellows, 148; Associates, 23; Juniors, 2.

Total Members Not Paid: 173.

and stated that bills marked *Final Notice* have been sent to all delinquents.

The names of those elected to membership are on page 182.

H. S. NEIMAN, *Secretary*

NEWS OF THE CHAPTERS

New York

The fourth regular meeting of the 1931 session was held at The Chemists' Club on the evening of Friday, January 16th. Chairman Frederick J. Kenney presided; there were present some sixty members and guests.

Following the dinner, which was served in the main dining room of the Club, Robert T. Pollock addressed the gathering on *The Coordination of Chemistry and Engineering as a Function of Industrial Development.* For full account of his talk, and the discussion which followed, see page 166.

Mr. Pollock's discourse provided many stimulating thoughts for the chemist. He illuminated the opportunities of the profession as those of broad interest, notwithstanding the necessity of specialization and unremitting attention to scientific detail.

Dr. F. G. Cottrell, Director of the Fixed Nitrogen Laboratories of the U. S. Department of Agriculture, a guest of honor, Dr. Breithut, National President of the Institute, Dr. Joseph F. X. Harold, and others discussed the points raised by Mr. Pollock.

The meeting adjourned at about 10:00 P. M.

Respectfully submitted,

LEON V. QUIGLEY, *Secretary*

Pennsylvania

The best attendance of the year featured the January meeting at the Engineers' Club, on Tuesday evening, January 6, 1931. Mr. F. D. Jones reported on the proceedings of the December National Council meeting. A report was read from Secretary Levitt, who was unavoidably absent.

Dr. Porter, chairman of the Trips Committee, submitted a list of tentative trips for March. In the ensuing discussion, the Art Museum and the Pennsylvania Museum were favored most, so Dr. Porter was directed to make arrangements for going through one of the two.

A letter from Dr. Wilmer Krusen was read, inviting the members of the Institute to attend the Memorial Meeting to be held in honor of the late Dr. Henry Leffman at the Wagner Free Institute of Science on January 16th.

Dr. Owen L. Shinn, of the University of Pennsylvania, then spoke on *Chemical Education in High School and College.* For the abstract of his talk see page 163. A lively discussion took place afterward, and at the close of the meeting Dr. Shinn was given a round of hearty applause and a rising vote of thanks.

F. D. JONES, *Secretary*

Washington

The December meeting of the Washington Chapter was held on the afternoon of December 17th, at the plant of the Elite Laundry Company. Mr. M. T. Gardner, manager of the plant, had arranged an inspection tour.

The members were divided into three groups, each group being in charge of a well-informed representative of the laundry who explained all of the intricacies of laundry practice and equipment. On completion of the inspection, Mr. Gardner explained in detail the value of chemistry to the proper control of laundering processes and his ready wit and engaging manner contributed greatly toward making the talk very interesting. Mr. Gardner also made a plea that customers should not judge the laundries too harshly for articles damaged as a result of being sent to the laundry and convinced the audience by the case method that in a majority of instances the laundering process was entirely blameless for faded colors and damaged textiles.

A short business meeting was held at which the Secretary was instructed to write a letter of thanks to the Elite Laundry Company to thank them for their courtesies.

On January 27th, members of the Washington Chapter and their ladies were guests of the Continental Baking Company on an inspection tour of their Washington bakery.

Mr. Donald Ballenger, of the bakery, conducted the group through the building explaining the processes from the mixing of flour on through the rising and baking stages. The feminine portion of the group seemed to be interested in the similarity of the processes to those carried out in the kitchen, while the men were fascinated by machines capable of beating a half-ton batch of biscuits or by the intricacies of the wrapping machines which measure off the right length of paper for each individual loaf and wrap and seal it all in one operation. After viewing the endless chain which carries the bread and bakes it at a temperature of 418° F. in 60–64 minutes, the guests were willing to agree that Wonder bread is, as advertised, really "slo-baked."

By the time the trip was finished, the smell of the newly-baked bread had pitched the appetites to the point where the lunch, furnished by the bakery, was doubly enjoyed. Not the least enjoyable feature of the evening was the charming hostess, Mrs. M. S. Stubbs, who had prepared the delightful lunch. She entertained the ladies during the short business meeting which was held in the offices of the Continental Baking Company.

At this meeting the Secretary was instructed to communicate with the Continental Baking Company and offer the thanks of the local

chapter for the entertaining and instructive evening. It was also voted to hold a dinner at the February meeting for which a prominent speaker will be secured and a committee was appointed to make all the necessary arrangements. No further business was transacted.

It is requested that any member of the Washington Chapter who is not receiving notice of meetings promptly, or whose address is not correct in the last directory will please notify the Secretary, O. E. May, at the Bureau of Chemistry and Soils, Color, and Farm Waste Division. It is further requested, that items of interest about members of the institute be sent to the reporter, J. D. Reid, at the same address, in order that the news of the Washington Chapter may be complete and perhaps some day occupy as much space, perhaps, as that occupied by our brothers in New York.

J. D. REID,
Secretary

TWINKLE, TWINKLE, LITTLE STAR

Scientific version

BY JEROME ALEXANDER

Twinkle, Twinkle, little star,
Chemists know just what you are;
Though your carbon content's high,
You're no diamond in the sky.

Helium and hydrogen
Form a part of you, we ken;
But your heat is much too great
For carbon in its crystal state.

And your spectral lines, beside,
Tell a tale you fain would hide—
If you're sixty or sixteen—
Billion years of course we mean.

These same lines, by twisting, prove
How and with what speed you move.
Watch your step, star, and beware
The spectrotelescopic stare.

Stars there are, we might remark,
Having ways unseen and dark;
The astronometer contrives
To find some leading double lives.

Betelguese, Orion's pride,
Lay false modesty aside;
By interference telescope,
Michelson has sized you up.

Twinkle, twinkle, little star,
We know just how warm you are,
By your color, red or blue.
We've your number—indexed too.

PERSONALS

W. J. BAEZA, for many years in charge of research and development for sugar and paper companies, has formed the INDUSTRIAL RESEARCH COMPANY with offices in the Chanin Building. The Company makes technical surveys and handles production, distribution, and development problems.

EUGENE C. BINGHAM, Professor of Chemistry at Lafayette College, read papers on the Fluidity Method for the Determination of Association, and the Flow of Dry Sand through Capillary Tubes. As a member of the Committee on Standards he submitted a report on the Absolute Viscosity of Water, at the second Annual Meeting of the Society of Rheology, recently held at Easton, Pa.

CHARLES H. HERTY recently told the joint session of the Georgia Legislature of the anonymous gift of $50,000 which has been advanced for research on his process for converting Georgia slash pine into paper, and thus makes possible a source of great wealth for the State.

A. L. MEHRING of the Bureau of Chemistry and Soils spoke on What's New in Fertilizers, on February 4th, during *Farmer's Week*, at the Ohio State University, Columbus, Ohio.

HERBERT R. MOODY of the College of the City of New York, has recently resigned as Chairman of the Employment Committee of The Chemists' Club. CHARLES R. DOWNS has been elected in his place.

ROBERT J. MOORE, Development Manager of the Varnish Resin Department of the Bakelite Corporation, addressed the Akron Section of the A. C. S. on Synthetic Resins and the Varnish Industry; and the Chicago Section on New Developments in the Paint and Varnish Industry.

LEON V. QUIGLEY, also of the Bakelite Corporation, recently delivered an illustrated lecture on Engineering Factors Underlying the Replacement of Metals by Synthetic Plastics before the Worcester, Mass. Section of the A.S.M.E.

ALLEN ROGERS of the Chemical Engineering Department of Pratt Institute was elected President, and ROBERT SCHWARZ was elected Vice-President at the recent Annual Meeting of The Association of Consulting Chemists and Chemical Engineers.

FRANK A. ROHRS of Teaneck, N. J., a Captain in the Chemical Warfare Service, has been ordered on active U. S. Army duty to take the Line and Staff Officers three-month-course at the Edgewood Arsenal, Edgewood, Md.

THOMAS A. WRIGHT, Technical Director of the Lucius Pitkin Laboratories has been appointed by President Hoover a member of the United States Assay Commission.

EMPLOYMENT NOTES

The Bureau of Employment of The Chemists' Club is co-operating with The American Institute of Chemists, so that some of the better positions listed with the Bureau may be brought to the attention of Institute members. The Bureau welcomes correspondence with any one interested in the following openings:

1282 Chemical Engineer, experienced in the asbestos textile business. Man under forty years of age. Location in the south.

1319 Biochemist, Ph.D., with some experience in agricultural biochemical work. Preferably one acquainted to some extent with horticulture and entomology. Location, Far West.

1477 Young man with some experience in patent and trade-mark law. New York metropolitan district.

1517 Opening for a man with some graduate training. Major, organic chemistry and minor in physical, for research work in infection and immunity.

The Bureau also has various positions for recent graduates, either bachelor's, master's, or doctor's, within the last two years.

It should of course be understood that Institute members would receive introductions to these employers only under the conditions of the Bureau's regular contract.

Opening for Specialist

CB-560–1: CHEMIST ON PAPER BOARD; Middle West; $4,000.00. Should be graduate of good engineering school and positively must have had experience in the manufacturing of paper board. Paper pulp men will not be considered unless they have had this paper-board experience. Communicate with Institute Secretary.

CHEMIST WANTED: Large manufacturer of insecticides needs a research testing chemist with special experience on insecticides. Communicate with Institute Secretary.

Positions Wanted

11X30 Graduate Chemist, 3 years' teaching experience, wishes position in research work or analytical chemistry.

11Y30 Graduate Chemist, 4 years' experience in analytical chemistry, metallurgy, and metallography, wishes position.

11Z30 Graduate Chemist, experienced in pharmaceutical and food chemistry, wishes position.

2X31 Chemist. Thoroughly experienced in malted milk business, and allied food industries; available now.

2Y31 Ph.D. in Biochemistry; experienced in research on food products and fermentation; available in June.

THE MEMBERS' FORUM

This department is intended for the frank discussion of Institute activities, published articles, etc. Your co-operation in helping to make it a success will be some evidence that chemists are not quite so inarticulate as is commonly supposed.—EDITOR

Is the Ordinary Bachelor's Degree Worth the Price?

Some, upon being asked this question, would readily reply in the affirmative. Others would feel doubtful. Generally speaking, any one will admit that a degree is worth the price, but in a general way. The average bachelor's degree received from our colleges is by all means essential to teachers, but of what greater advantage is it to one who wishes to enter into the professional world unless he enters the field in which he specialized?

The writer is a graduate of a southern college, with his major work in chemistry and minor in biology. Yet to face bare facts, was it better to major in chemistry or in some other subject? Having taught science for three years, it was essential that he have his major in this field, yet are science teachers any more in demand, or better paid, than those teaching other subjects? To my mind the answer is negative, yet any one who has had experience in the teaching profession will admit that the sciences are as hard, if not harder, to teach than any of the other subjects in the school curriculum.

We have our agencies for teachers everywhere. Why not have more for the chemist? Is the chemist to "take a back seat" while the other professions forge ahead? Are they so little in demand that they are so easily secured? And yet a great many students who take their major work in chemistry do so with the hopes that after they are graduated they will receive employment with some company where they can use their knowledge in the field in which they have specialized. Sad but true, they are disappointed; the writer speaks from experience.

A business man recently remarked to me that a high school graduate who has also been graduated from a business college has a far better chance in the professional world than the college graduate. If this is true and if this is the attitude the business world takes toward a college graduate, why graduate from college? Is there any need for sacrifice on the part of parents, or for the young man and woman to borrow money to receive an education which will take them years to pay back; and, after finishing, take what they can get, probably far from the field in which they specialize?

Again I ask: "Is the ordinary Bachelor's degree worth the price?"

L. C. ELMORE
Southern Public Utilities Company
Winston-Salem, North Carolina

A QUESTION FOR DISCUSSION

In addressing the Institute, a corporation executive once said: **"Ninety per cent of chemical research work is destructive of capital."** Would your own experience make you agree with him? If so, why; if not, why not?

The Editor will always welcome signed discussion of any article which appears in *The* CHEMIST; or any presentation and discussion of problems of particular interest to chemists.

THE NEW MEMBERS

Fellow

AVENIR PROSKOURIAKOFF, Associate in Physiological Chemistry and Toxicology, Jefferson Medical College, Lansdowne, Pa.

Associate

WALTER K. NELSON, Research Chemist, Titanium Pigment Co., Inc., 105 York Street, Brooklyn, N. Y.

Juniors

MICHAEL FREDERICK, Assistant Chemist, Van Dyk and Company, 57 Wilkinson Avenue, Jersey City, N. J.

MORTON M. JACOBS, Laboratory Assistant, N. Y. C. Department of Health, Chemical Laboratory, Foot of E. 16th St., New York, N. Y.

ALEXANDER JAMES STIRTON, Junior Chemist, Bureau of Chemistry and Soils, U. S. Department of Agriculture, Washington, D. C.

GEORGE E. WARD, Junior Chemist, Bureau of Chemistry and Soils, Department of Agriculture, Washington, D. C.

PERCY A. WELLS, Assistant Chemist, Bureau of Chemistry and Soils, Department of Agriculture, Washington, D. C.

Please add these names to your roster.

APPLICATIONS FOR MEMBERSHIP

Applications have been received from the following:

Fellows

MARSHALL J. GOSS, Associate Chemist, Bureau of Chemistry and Soils, Department of Agriculture, Washington, D. C.

CHARLES LYMAN RAND, Director of Research, Mitchell Rand Manufacturing Co., 18 Vesey Street, New York, N. Y.

Associates

RUBIN H. FEINGOLD, Chemist, Department of Health, Foot of East 16th Street, New York, N. Y.

JOSEPH JAMES STUBBS, Junior Chemist, U. S. Department of Agriculture, Bureau of Chemistry and Soils, Color and Farm Waste Division, Washington, D. C.

Juniors

ALVIN WILSON UNDERKOFFLER, Senior Student, Juniata College, Huntingdon, Pa.

These applications will be acted upon at the next Council meeting, February 27th.

EDITORIAL

The Chemists' Club

"If you are looking for a chemist, you should go where chemists go." And if the chemist-seekers of the past might ever have had two thoughts on direction, those of the present and future need look no farther than The Chemists' Club at 52 East 41st Street, New York.

Housed in The Chemists' Building, which once could look loftily down on rows and rows of Murray Hill's exclusive brown stone residences, but now seems to be planted in the midst of an ever thickening forest of sky-scraping office buildings, The Club is known to chemists all over the world as a center of friendliness and hospitality.

Here the chemist is himself, the *person*, not the *scientist*. An awed chemistry senior once remarked to us, "Imagine being able to go to a place where you can see all the wonderful men who wrote the textbooks." If one sat in the lobby long enough, one would doubtless see them all in time, but around The Club, there is no parading of textbooks, nor any other indication of the professional armor which the professor, or the consultant, or the industrial magnate is expected to wear before the world. Here he can be himself, because here he can feel thoroughly at home.

The results of the extensive renovations which have recently transformed The Chemists' Club are more than sufficient compensation for any inconvenience which may have been suffered during their process. Rumford Hall is now the last word in a comfortable lounge, and truly "The Chemists' Castle"—a sacrosanct preserve into which no woman (chemist or lady) may intrude more than the tip of her inquisitive nose.

For several seasons the Institute has enjoyed the hospitality and privileges of The Club, for the regular meetings of the New York Chapter, and for an occasional annual meeting of our national organization. Although it was accorded most heartily at the time, it is only fitting to express once more our great appreciation to Lewis H. Marks of the House Committee for his remarkable feat in having the main dining room ready, as promised, for the Joint Meeting of the Chemical Societies, which was held under the auspices of the Institute on December 12th, before the official opening of the renovated Club.

Now, while the echoes of the official house-warming are still about us, the Institute takes pleasure in extending to President Lawrence V. Redman, F.A.I.C., and to The Chemists' Club its congratulations and good wishes for the pros-

perity and success which are its due.

And, as a last thought, let us add our tribute to those expressed by many of our own members at the luncheon which was recently given at the Club in honor of Mrs. Morris Loeb.

The Chemists' Club stands today as the living memorial to the generosity of Dr. Loeb, a chemist whose interest went beneath and beyond the science of chemistry to his fellow professional chemists whose personal efforts have made its advancement possible.

—F. E. W.

NOTICE

Closing date for April issue: March 25th. Please send everything intended for publication to your nearest reporting editor, or directly to Florence E. Wall, Editor, at 233 Broadway, New York City.

E & A

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